
MECHANICAL HAZARDOUS FUELS TREATMENT METHODS

THINNING

Thinning is a forest cultural treatment made to reduce stand density of trees primarily to improve growth, enhance forest health, improve forest resiliency to natural disturbances, or recover potential mortality. The purpose of thinning for hazardous fuel treatments is to increase the distance between tree crowns in order to reduce the chance the fire will spread between them, decrease fire intensity and severity of impacts, and/or to remove ladder fuels to reduce the possibility that a surface fire will transition to a crown fire. Thinning from below – the removal of all trees below a certain diameter – is the most common fire management thinning prescription. It can be done by hand or using a wide variety of equipment.

BLM Medford District is implementing a pilot project in biomass treatment to thin forest residues and improve the Community Defense Zone of an adjacent community. The 300 acre project is modeled after Lassen National Forest projects on the Eagle Lake Ranger District which have treated almost 25,000 acres of defensible fuel profile zones along major roads and strategic ridges.

- Biomass operations utilize track or rubber-mounted equipment which cuts the tree near ground level (usually 3" or lower stumps) and then uses grapples to carefully stack them in bundles without damaging nearby trees.
- The bundles, or “doodles” as they are called, are “skidded” to a central location for processing. Typically, both these machines are rubber-tired with wide footprints and are considered “low ground pressure”. Since there is minimal soil disturbance and compaction, the harvest areas appear “natural” within a short recovery time (from several months to a few years).
- Large chippers, or “tub grinders” chip the limbs, bark and wood and blow the material (“dirty chips”) into a van where the material is transported to a plant. The biomass is burned to create steam for electrical power generation, or is “co-fired” with coal or other fuels sources.



Timberjack with several trees in the grapple

MECHANICAL FUELS TREATMENT



Whole tree harvesting, also called biomass harvesting, is the process of cutting and removing small trees from forest stands and utilizing nearly all the tree for a variety of forest products. Materials generated from biomass thinning can be used in several ways:

- Small sawtimber for dimensional lumber, such as studs
- Soil amendments including mulch or compost
- Pulp chips for the paper industry
- Small diameter roundwood for poles or posts
- Reconstituted lumber made into solid wood panels, laminated-veneer lumber, glue-laminated beams
- Composite panels for roof sheathing, siding, paneling, insulation boards, shelving
- Wood fiber-reinforced plastics for storage bins, furniture components, automobile components, floor, wall and roofing packages, containers, cartons, and pallets
- Organic chemicals including carbon, oxygen, and hydrogen
- Bark, wood and needle biomass can be used to generate steam for electricity
- Wood chips can be converted to transportation fuels such as ethanol and diesel



Caterpillar grapple skidder with a doodle of small trees on frozen ground



Slashbuster used for thinning hazardous fuels.

MECHANICAL FUELS TREATMENT



CHOPPING, GRINDING, AND MOWING

These techniques are generally used on dense areas of small, live fuels such as brush and small diameter trees. All three work by breaking fuels into small pieces and leaving them on the forest floor. Chopping and mowing are very similar, and usually involve dragging a mowing or chopping device behind a bulldozer or tractor. Grinders involve the use of a rotating head attached to an articulated arm (e.g. on an excavator), and operate by topping and grinding trees down to the stump.

Mowing Highlight

The BLM used a hydromower to complete a 906-acre fuels reduction project at Grandview Ridge, within the city limits of Durango, Colorado. Advantages to using the hydromower include:

- A lawnmower-like blade grinds up shrubs and trees up to 10-12 inches in diameter. The double-bladed mower reduces all material to about 4-6 inches in size.
- Mulch is spit out in front of the machine allowing mower to travel over mulch, reducing surface disturbance.
- Large rubber floatation tires ease across the surface, reducing rutting and erosion potential.
- In dense pinyon-juniper about 10-12 inches in diameter, the hydromower can treat 3/4 of an acre per hour.
- Average cost is \$100-120 per hour for machine and labor.
- The mulch provides cover for the grass seed that was aerially applied before the thinning.



For more information contact Randy Lewis, Bureau of Land Management, at 970-385-1358 or Randy_Lewis@co.blm.gov.

MECHANICAL FUELS TREATMENT



Grinding Highlight

The South Platte Ranger District, Pike and San Isabel National Forests, conducted a fuels reduction project to masticate smaller trees using a hydro ax. The site was located near Deckers, Colorado at about 6,500 feet. The average slope of the area was 10 to 15 percent.

- The Hydro Ax cuts the tree into chunks with the larger pieces about 6 to 8 inches across the longest axis. The chunks are well distributed with a fuel depth that averages less than 6 inches.
- The machine can reach about 15 feet above the ground and grind the lower portion of the bole to a 6-inch stump.
- The Hydro Ax can cut tree greater than 12-inches dbh, but is most efficient on trees less than 5-inches dbh.
- The contract cost was \$165 per hour. It took 15 hours to accomplish 12.2 acres, about \$200 per acre. Slope, tree size, and density are likely to be the biggest variables in the operational costs.
- The rubber-tired machine is limited to slopes less than 30 percent, and works most efficiently on slopes less than 15 percent.



The mastication head mounted on the Hydro Ax 621 E.

For further information contact Jim Thinnies at jthinnies@fs.fed.us, (303) 275-5613; or, Dan Len at dlen@fs.fed.us, (970) 295-5751.



The Hydro Ax has big rubber tires that are light on the land.

MECHANICAL FUELS TREATMENT



CHIPPING

This refers to the process of chipping material after it has been cut. Material can either be brought to a landing and chipped into the back of a truck for removal, or it can be blown back onto the land.

Wood chips can be scattered on the ground to provide an effective layer of soil protection and return nutrients to the soil. The material can also be used to generate electricity, produce ethanol, and mixed with other materials in the composting process.

Highlight

- The Idaho City Ranger District, Boise National Forest, conducted a demonstration of a CT-24 chipper. It was viewed as a viable option for fuel up to six inches in diameter.
- It is powered by a 25 horsepower Koehler engine, requires manual feed, has a 6-inch stem capacity.
- The chipper is mounted on a tandem axle trailer that weighs 1700 pounds and has a 270-degree rotational discharge chute. A 3½ cubic yard container is optional.



A cubic yard of chipped material, using the CT-24 chipper.



A CT-24 Chipper chipping slash, "big end first."

- The slash piles had been hand built and the first pile was about 20 cubic yard of limbs and tops. It took 30 minutes to reduce 20 cubic yards of limbs and tops. About 80 cubic yards of material was reduced to nearly five cubic yards of chips.

- The unit has an average reduction ratio of 16:1 (16 yards of slash were reduced to one yard of chips).

For further information contact Leonard Roeber at the Idaho City Ranger District, (208) 392-6681 or lroeber@fs.fed.us.

MECHANICAL FUELS TREATMENT



PILING

Piling simply refers to the process of piling material after it has been cut. It can be performed by hand or using machinery. Piles are generally meant to be burned at a later date, and are used in areas where fuel loadings are too high to permit broadcast burning. Hand piling is usually used for very small material, and machine piling is used on larger material.



Machine piling logging slash and hazardous fuels.

MECHANICAL FUELS TREATMENT

